



THE OHIO STATE UNIVERSITY
COLLEGE OF ENGINEERING

Electrochemical Energy Conversion and Storage Systems for Automotive Applications

MECHENG 7383

Credit Hours:

3.00 - 3.00

Course Levels:

Graduate (5000-8000 level)

Course Components:

Lecture

Independent Study

Course Description:

Electrochemical energy storage (batteries) and conversion (fuel cells) systems for automotive applications covering state of the art principles of operations and modeling.

Prerequisites and Co-requisites:

Prereq: 6526 (726), or Grad standing in Engineering, or permission of instructor.

Course Goals / Objectives:

- Understand the basic principles of electrochemistry, thermodynamics, heat and mass transfer and their application to electrochemical energy converters (fuel cells) and storage (batteries, capacitors) systems
 - Present the types of fuel cells and energy storage systems today in use for automotive systems, together with their operating principles, characteristics and performance metrics
 - Introduce and apply modeling principles to characterize the voltage/thermal response of battery cells as well as the performance of PEM fuel cell stacks and systems
 - Present system low-level control principles for fuel cell and battery automotive systems under dynamic conditions representative of target applications
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Course Topics:

- Review of principles of electrochemistry
 - Introduction to secondary battery cells for automotive applications
 - Introduction to capacitors
 - Modeling of electrochemical battery cells
 - Control of battery systems
 - Fuel cell stacks
 - Fuel cell systems
 - Fuels for fuel cell systems
 - Modeling of fuel cell systems
 - Low-level control of fuel cell systems
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Designation:

Elective